Version:2020-02

PH/DO Controller

6000 Series

800 Series

Content

Unpacking instruction

Check for any damages on the content after unpacking.
Read the manual before installing and operating the instruments.
Confirm the wiring connections with the wiring diagram before switching on the power to avoid damages and injuries.

Safety precaution

1. The instrument must be operated by trained professional and technical personnel.
2. Avoid installing in a high humidity, high temperature, corrosive and in direct with sunlight environment.
3. Separate instrument signal cables from power lines and machine that produces high noise interference.

Instrument application

Widely used in industrial wastewater treatment, aquaculture, environmental monitoring, food process etc.

Product content

1. 6000 series
1 meter, 1 operational manual, 1 quality check form, and four sets of mounting kits (Fixed box, fixed bar and screw).

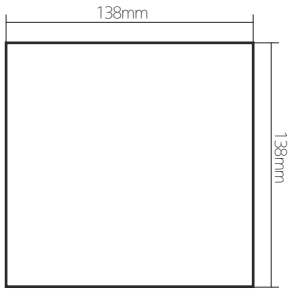
2. 800 series
1 meter, 1 operational manual, 1 quality check form, and two sets of mounting kits

Specifications

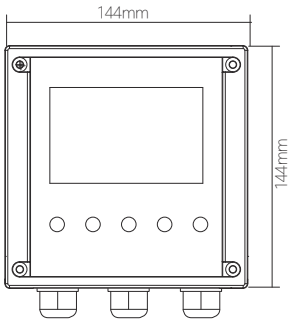
Functions	pH	DO
Measuring range	-2.00pH to +16.00 pH	0.00 to 30.00ppm(0.0-300.0%)
Resolution	0.01pH	0.01ppm/ 0.1%
Accuracy	±0.01pH	±0.02ppm/±0.2%
Temp. compensation	6000 series:NTC22K 800 Series: Pt1000 / NTC22K	
Temp. range	-10.0 to +130.0℃	
Temp. compensation range	-10.0 to +130.0℃	
Temp. resolution	0.1℃	
Temp. accuracy	±0.2℃	
Ambient temperature range	0 to +70℃	
Storage temp.	-20 to +70℃	
Input impedance	$>10^{12}\Omega$	
Display	Back light,dot matrix	
pH current output	Isolated, 4 to 20mA output , max. load 500Ω	
DO current output	Isolated, 4 to 20mA output , max. load 500Ω	
Current output accuracy	±0.05 mA	
RS485	Mod bus RTU protocol	
Baud rate	9600/19200/38400	
MAX. relay contacts capacity	5A/250VAC, 5A/30VDC	
Cleaning setting	ON: 1 to 1000 seconds, OFF: 0.1 to 1000.0 hours	
One multi-function relay	clean/period alarm/error alarm	
Relay delay	0-120 seconds	
Data logging capacity	500,000 data	
Language selection	English/ traditional Chinese/ simplified Chinese	
USB port(for 6000 series only)	Download records and update program	
IP Rating	IP65	
Power supply	From 90 to 260VAC, power consumption<5 watts	
Installation	panel/wall/pipe installation	
Weight	6000 series:0.85Kg/ 800 series:0.55Kg	

Instrument installation

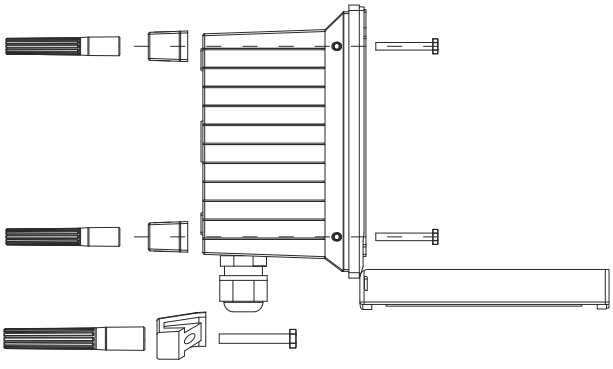
6000 series : The instrument can be panel, wall or pipe mounted installation.
Panel Installation: Make a 138x138 mm square cutout and insert the instrument.
Screw in the fixed block with the screws and fixed bar.



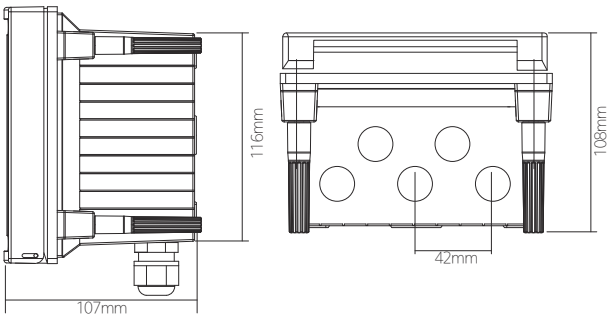
Cutout size - 6000 series



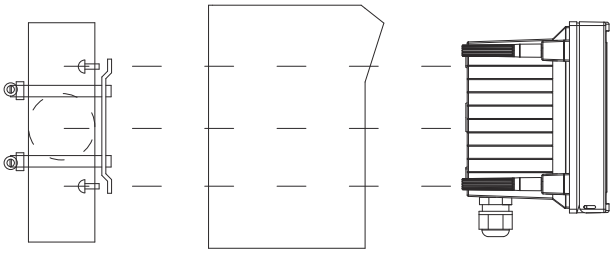
Front view – 6000 Series



Exploded view – 6000 Series



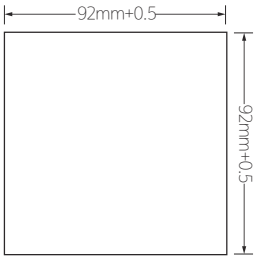
Side and bottom view – 6000 Series



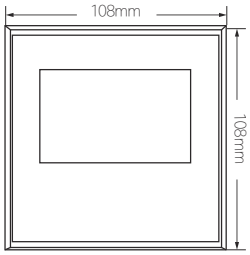
Wall and pipe installation – 6000 Series

Instrument installation

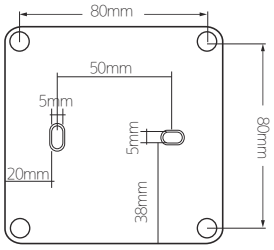
800 Series:The instrument can be panel, wall or pipe mounted installation.
To install 800 series on panel, make a 92x92 mm square cutout and insert the instrument then screw in the fixed HOLDER.



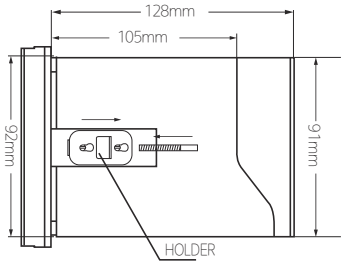
Cutout size - 800 series



Front view – 800 Series



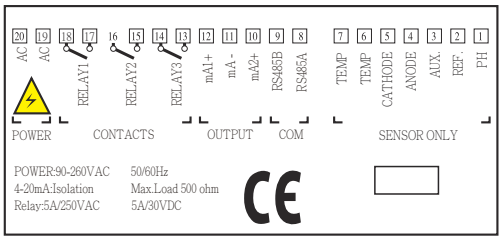
Back view – 800 series



Side view – 800 series

Connection label

6000 Series



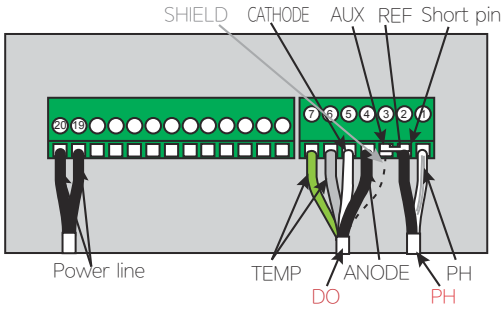
Notice

1. User must strip the ION wire to remove the black rubber conductor.

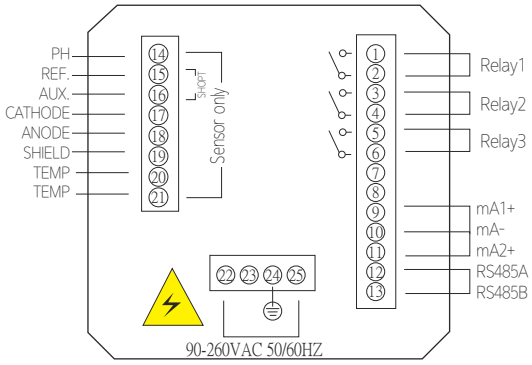
Rubber conductor not removed Rubber conductor removed

2. Different connection of 2-wire electrode (short pin 2 and 3) and 3-wire electrode (ground pin), Please see the connect label.

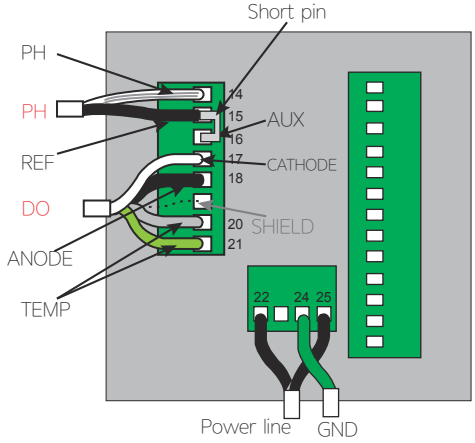
Electrode connection figure



Connection label (800 series)

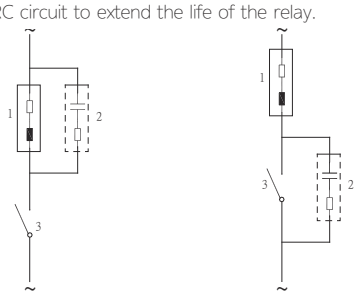


Electrode connection figure (800 series)

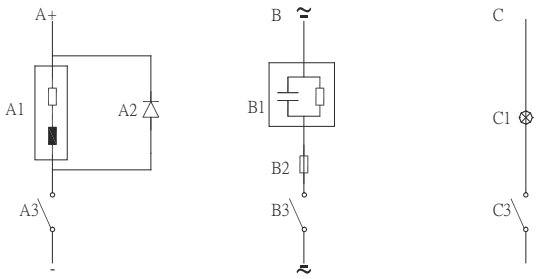


Relay contact protection

Electrical spark at the relay contact may affect the life of the relay, especially in an inductive and capacitive load. In order to inhibit the spark and arc, user should use an RC circuit to extend the life of the relay.

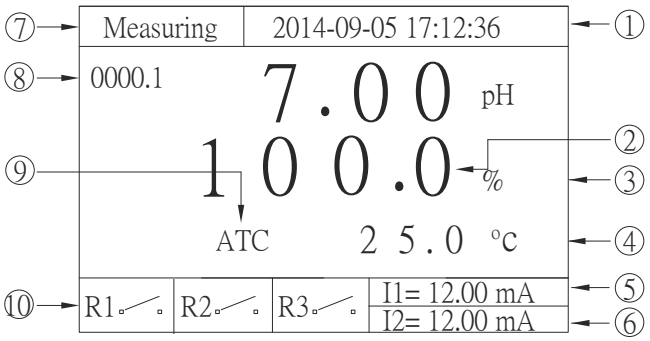


AC protection, use for inductive load
1. Load
2. RC eliminate spark, using in 220VAC, R=100 ohm1W,
3. Relay contact



DC protection: A1 - Inductive load || A2 - 1N4007 || A3 - Relay contact
AC/DC protection: B1 - Capacitive load || B2: 0.8 Ohm/1W (DC24V) ||B3 - Relay contact
Resistive load: C1 - Lamp bulb ||C3 - Relay contact

Measurement display



1. Date and time
2. Main measurement display
3. Unit
4. Temperature and unit
5. Current output 1
6. Current output 2
7. Measurement status and error indicator (Does not show when meter is in keeping mode)
8. Count down timer - Cycle time/ clean time (Displays "delay" when relay3 has delay function enabled)
9. Temperature compensation (ATC - Automatic or MTC – Manual)
10. Relay status indicator

Note:
If the pH readings are under or over the range, it will display -9.99/99.99.
If the DO readings are under or over the range, it will display 0.0/999.9%.
If the temperature readings are under or over the range, it will display -99.9/999.9.

Buttons

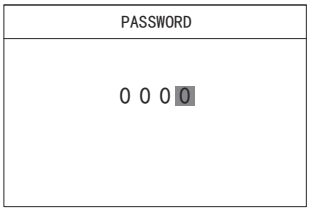
Key name	Meas. status	Setting status	Cal. status	Record status
MODE	Enter password	Exit	Exit	Exit
SHIFT	none	Move digit	Mode digit	Mode digit
UP	Enter record	Inc	Inc	Inc
DOWN	None	Dec	Dec	Dec
ENTER	ON/OFFback light	Enter	Enter	Enter

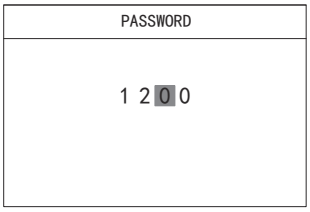
Keeping mode

1. Activates during startups, setting, calibration, record, and cleaning.
2. Relay will return to default status – All relays will not be energized (Inactive).
3. Current output:
a) Fixed current – Values set on output test
b) Last current – Hold the last output before entering Keeping mode.
4. Keeping mode will be deactivated 10 seconds after returning to measurement mode.

Setting

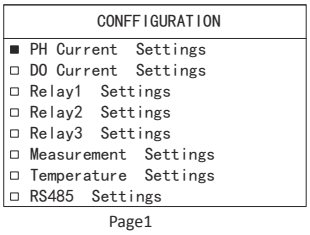
Press MODE key to enter the password menu and then press UP/DOWN/SHIFT key to input password 1200 then press ENTER will enter to setting mode or press MODE key to exit. Controller will return to measurement mode after 10 minutes of inactivity.



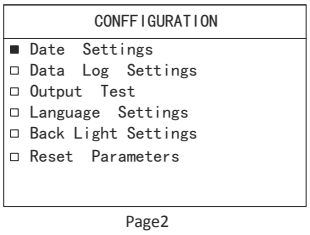


Main display

Press UP/DOWN key to choose functions, press ENTER key enter the function.



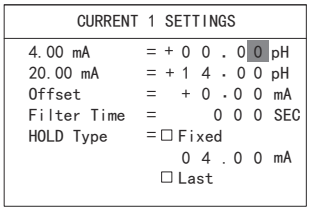
Page1



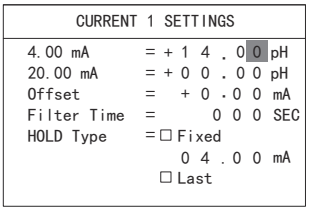
Page2

Note:
1. Error on measurement page indicates that input data is not in the correct range.
2. Press ENTER on setting pages to save any changed data.
3. Press MODE to return to the previous page.
4. Meter will return to measurement mode after 10 minutes of inactivity.

pH Current settings

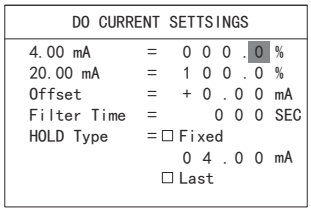


OR



1. Set the PH value to the corresponding 4.00mA and 20.00mA point.
2. The minimum range between 4.00mA and 20.00 mA at least is 1.00pH.
3. Set the offset current of ppm, the range is±1.00mA.
4. The filter time range is 0-120 seconds. The low pass filter of software will be activated when the current from one point to another point if user sets the filter time.
5. Set the current 1 output mode(fixed / last) when instrument enter into keeping mode.

DO Current settings



1. Set the DO value to the corresponding 4.00mA and 20.00mA point.
2. The minimum range between 4.00mA and 20.00 mA is 10.0%.
3. Set the offset current of temperature (The maximum range is±1.00mA).
4. The filter time range is 0-120 seconds. The low pass filter of software will be activated when the current from one point to another point if user sets the filter time.
5. Set the current 2 output mode (Fixed / Last) during keeping mode.

Relay 1 settings

RELAY 1 SETTINGS	
Mode	= ■ pH
	□ DO
ON/OFF	= □ ON
	□ OFF
Close S.P.	= + 1 0 .0 0 pH
Open S.P.	= + 0 4 .0 0 pH
Delay Time	= 0 0 0 SEC

1.Choose the display mode.
2. Press UP/DOWN key to ON/OFF (enable/disable) relay1.
3. Close set point: Target value to activate relay.
4. Open set point: Target value to deactivate relay.
5. Delay time: Relay will only be activated when this timer time out. Timer range from 0 to 120 seconds.

Ex: User targets to switch on the pump at 10.00pH and switch off at 04.00pH. Set close S.P. to 10.00pH and open S.P. to 04.00pH.

Relay 2 settings

RELAY 2 SETTINGS	
Mode	= □ pH
	■ DO
ON/OFF	= □ ON
	□ OFF
Close S.P.	= 0 2 .0 0 mg/L
Open S.P.	= 0 8 .0 0 mg/L
Delay Time	= 0 0 0 SEC

1.Choose the display mode.
2. Press UP/DOWN key to ON/OFF (enable/disable) relay2.
3. Close set point: Target value to activate relay.
4. Open set point: Target value to deactivate relay.
5. Delay time: Relay will only be activated when this timer time out. Timer range from 0 to 120 seconds.

Ex: User targets to switch on the pump at 02.00mg/L and switch off at 08.00mg/L. Set close S.P. to 02.00mg/L and open S.P. to 08.00mg/L.

Relay 3 settings

RELAY 3 SETTINGS	
ON/OFF	= ■ ON
	= □ OFF
Period Time	= 0 0 0 1 . 0 HOUR
Clean Time	= 0 0 1 0 SEC
Delay Time	= 0 0 0 SEC
Function	= □ Rinsing
	□ Interval Alarm
	□ Error Alarm

1. ON/OFF : Press UP/DOWN key to ON/OFF(enable/disable) relay 3.
2. Period time : Rinsing or interval function only.
3. Clean time : Relay operation period.
4. Delay time : Relay will only be activated when this timer time out.
5. Function : Press UP/DOWN key to select Rinsing/Interval/Error.

Notice:
1. Rinsing: Relay will be activated when period time out. Relay will remain activated throughout cleaning time. Period time will restart when cleaning is completed.
2. Interval alarm: Relay will be activated when period time out. Relay will remain activated until user resets the alarm. Period time will restart.
3. Error alarm: Relay will be activated when an error is detected. Timer is not available for this function.

Measurement settings

MEASUREMENT SETTINGS	
Unit	= ■ %
	□ ppm
	□ mg/L
PH Offset	= + 0 .0 0 pH
DO Offset	= + 0 0. 0 %
Filter	= 0 1

1. Unit: select the measuring unit.
2. PH offset : offset for the pH readings.
3. DO offset : offset for the DO readings.
4. Filter: average the readings.

Temperature setting (6000 Series)

TEMPERATURE SETTSINGS	
Automatic	= ■ Auto
	□ Manual
Offset	= + 0 .0 ℃
Manual Meas.	= + 0 2 5 .0 ℃
Manual Cal.	= 2 5 .0 ℃
Display	= □ YES
	□ NO

1. Automatic: select ATC or MTC
2. Offset: offset for the readings.
3. Manual measuring: the temperature is for measuring mode when it uses MTC.
4. Manual calibration: the temperature is for calibration mode when it uses MTC.
5. Display: display the temperature on measuring mode or not.

Temperature setting (800 Series) Page 1

TEMPERATURE SETTSINGS	
Automatic	= ■ Auto
	□ Manual
Probe	= ■ Pt 1000
	□ NTC 22K
Offset	= + 0 .0 ℃
Manual Meas.	= + 0 2 5 .0 ℃
Manual Cal.	= 2 5 .0 ℃

1. Automatic: select ATC or MTC
2. Probe: select probe type.
3. Offset: offset for the readings.
4. Manual measuring: the temperature is for measuring mode when it uses MTC.
5. Manual calibration: the temperature is for calibration mode when it uses MTC.

Temperature setting (800 Series)Page 2

TEMPERATURE SETTSINGS	
Display	= ■ YES
	□ NO

6. Display: display the temperature on measuring mode or not.

RS485 settings

RS485 SETTSINGS	
ID Address	= 0 0 1
Baud Rate	= □ 9600
	= □ 19200
	= □ 34800

1. ID Address: 1-255
2. Baud Rate: Press UP/DOWN key to select correct baud rate.

Date settings

DATE SETTSINGS	
Year	= 2 0 1 5
Month	= 0 8
Day	= 1 5
Hour	= 1 3
Minute	= 3 6
Second	= 0 4

Press UP/DOWN key to set the date. Clock will continue to run for about 1 week after power down.

Data log settings

DATA LOG SETTSINGS	
OFF/ON	= ■ ON
	□ OFF
Reset Record	= □ Yes
	= □ No
Save Period	= 0 6 0 SEC

1. ON/OFF: Enable or disable data logging function.
2. Reset Record: Erase all recorded data.
3. Saving Period: Recording interval.

Notice: Reset record will take around 10 seconds.

Output test

OUTPUT TEST	
Current1	= 0 4 . 0 0 mA
Current2	= 0 4 . 0 0 mA
Relay1	= □ CLOSE
	□ OPEN
Relay2	= □ CLOSE
	= □ OPEN
Relay3	= □ CLOSE
	= □ OPEN

1. Current 1: Injects current ranging from 4.00-20.00mA to the output. Press UP/DOWN to set.
2. Current 2: Injects current ranging from 4.00-20.00mA to the output. Press UP/DOWN to set.
3. Relay 1: Open or close contact. Press UP/DOWN to select.
4. Relay 2: Open or close contact. Press UP/DOWN to select.
5. Relay 3: Open or close contact. Press UP/DOWN to select.

Notice: This function for testing the output only.

Language settings

LANGUAGE SETTSINGS	
Language	=■ English =□ 繁體中文 =□ 简体中文

Language preference. Press UP/DOWN key to select the language.

Back light settings

BACK LIGHT SETTING	
Back Light	=■ 60 Seconds =□ Manual

60 seconds : The back light will turn off when no key is be pressed in 60 seconds.
Manual: User needs to press the ENTER key to turn on/off the back light in measuring mode

Reset parameters

RESET PARAMETERS	
Reset Type	=■ Current =□ Relay1 =□ Relay2 =□ Relay3 =□ All

Reset all parameters. Press UP/DOWN key to select the targeted preference to reset.

Notice: The reset will not affect the calibrated parameters.

Record query

Press UP key at the measurement mode to enter record query mode.

INPUT RECORD START NUMBER
0 1 0 3 0 0

Press UP/DOWN and SHIFT key to input record number then press ENTER key to confirm record number or press MODE key to exit.

Display (pH/DO) data in detail view

RECORD 0020300		
15-08-14 21:20:49	07.00 99.8	pH %
15-08-14 21:20:59	07.00 99.8	pH %
15-08-14 21:21:09	07.00 99.8	pH %
15-08-14 21:21:19	07.00 99.8	pH %
15-08-14 21:21:29	07.00 99.8	pH %

Calibration

Press MODE key to enter the password menu. Then, press UP/DOWN/SHIFT key to input password 1100. Pressing ENTER will proceed to calibration mode or press MODE to exit. If no key is pressed for over 10 minute, then it will go back to measurement mode.

PASSWORD
0 0 0 0

PASSWORD
1 1 0 0

Main display

CALIBRATION
■ PH Automatic CAL.
□ PH Manual CAL.
□ PH Reset Parameters
□ DO Parameters Settinges
□ DO Zero CAL.
□ DO Saturation CAL.
□ DO Concentration CAL.
□ DO Reset Parameters

Press UP/DOWN key to select the functions and then press ENTER key to confirm.
1. PH Automatic calibration: follow the indication to select standard buffer.
2. PH Manual input calibration: manual input standard buffer.
3. PH Reset parameters: reset all of the calibrated parameters to default.
4. DO Parameters settings: set the parameters
5. DO Zero calibration: calibrate the zero point
6. DO Saturation calibration: calibrate the saturation point
7. DO Concentration calibration: calibrate the concentration
8. DO Reset parameters: reset all of the calibrated parameters to default.

Notice:
If the PH electrode efficiency is lower than 80% or the waiting time is too long and can not locked, user should check the electrode if aged, user should Replace the new electrode.

PH Automatic calibration

Stand calibration

CALIBRATION	
■ 6.86 □ 7.00	7.00 pH 25.0 ℃
Select buffer and press ENTER	

1. Put the electrode to the first buffer.
2. Press UP/DOWN key to select the correct buffer and then press ENTER to start calibration.
3. User can press ENTER to go to next or wait for it auto lock.
4. Display the idea pH on the right side.
5. If the offset is over +/-1.5 pH or temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

Slope calibration

CALIBRATION	
□ 1.68 ■ 4.01 □ 9.18 □ 10.01 □ 12.45	4.00 pH 25.0 ℃
Select buffer and press ENTER	

1. Put the electrode to the second buffer.
2. Press UP/DOWN key to select the correct buffer and then press ENTER to start calibration.
3. User can press ENTER to go to next or wait for it auto lock.
4. Display the idea pH on the right side.
5. If the offset is over 30% or temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

Display efficiency

CALIBRATION	
04.01	4.00 pH 25.0 ℃
SLOPE = 57.8 mV/pH	
EFFICIENCY = 98.0 %	

If the efficiency is lower than 80%, that means the electrode is aged, user should Replace the new electrode.

PH Manual calibration

Stand calibration

CALIBRATION	
7.00	7.00 pH 25.0 ℃
Input buffer and press ENTER	

1. Put the electrode to the first buffer.
2. Press UP/DOWN key input the standard buffer and then press ENTER key to start calibration. User can press ENTER to go to next or wait for it auto lock.
3. Display the idea pH on the right side.
4. If the idea pH is over 7.00+/-1.5 pH or temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

Slope calibration

CALIBRATION	
4.01	4.00 pH 25.0 ℃
Input buffer and press ENTER	

1. Put the electrode to the second buffer.
2. Press UP/DOWN key input the standard buffer and then press ENTER key to start calibration. User can press ENTER to go to next or wait for it auto lock.
3. Display the idea pH on the right side.
4. If the input is over 0.00-14.00 pH, or temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

Display efficiency

CALIBRATION	
04.01	4.00 pH 25.0 ℃
SLOPE = 57.8 mV/pH	
EFFICIENCY = 98.0 %	

If the efficiency is lower than 80%, that means the electrode is aged, user should Replace the new electrode.

PH Reset parameters

RESET PARAMETERS
Reset

This will reset all the calibrated parameters to default.

DO Parameters settings

PARAMETERS SETTINGS
Pressure = 1013 mRAR Salinity = 00.0 ppt Membrane = 3.06 %

1. Pressure range is from 500 to 9999 mbar. Ex: if DO sensor is be used with 1KG pressure in fermentation. User should modify the pressure to 2026 mBar
2. Press UP/DOWN key to input the salinity. The range is from 0.0 to 50.0 ppt
3. Press UP/DOWN key to input the coefficient of membrane. The range is from 0.01% to 9.99%. It depends on the Membrane type.

DO Zero calibration

ZERO CALIBRATION
+011.1 nA(25.0℃) 25.0 ℃
Wait select and press ENTER

1. Put the DO electrode into the nitrogen or saturated solution of anhydrous sodium sulfite.
2. Waiting for the current is stable then press ENTER to finish the calibration.

Notice:
1. The zero point current range is from -2nA to +10nA, if the current is over the range then make sure the DO electrode is good.
2. If the temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

DO Saturation calibration

SATURATION CALIBRATION
+00066.1 nA(25.0℃) 25.0 ℃
Wait stable and press ENTER

1. Use the calibration bottle(with sponge and water) to calibrate DO in 100%. You can also calibrate in air as your 100% calibration.
2. Waiting for the current is stable then press ENTER to go to next or press MODE to exit

SATURATION CALIBRATION
+00066.1 nA(25.0℃) 25.2 ℃ 100.0 %
Input standard data

1. Input standard data, the range is form 50% to 200%.
2. Press ENTER to finish the calibration or press the MODE to exit.

Notice:
1. The saturation current is from +25nA to +200nA,if the current is over the range, please make sure the DO electrode is good.
2. If the temperature is over 0.0-60.0℃ ℃then it will display error message on the button of LCD.

DO Concentration calibration

CONCENTRATION CALIBRATION
+00066.1 nA(25.0℃) 25.0 ℃
Wait stable and press ENTER

1. Use the calibration bottle(with sponge and water) to calibrate DO in concentration. You can also calibrate in air as your concentration calibration.
2. Waiting for the current is stable then press ENTER to go to next or press MODE to exit

CONCENTRATION CALIBRATION
+00066.1 nA(25.0℃) 25.2 ℃ 08.20 ppm
Input standard data

1. Input standard data, the range is form 4.00 to 20.00 ppm.
2. Press ENTER to finish the calibration or press the MODE to exit.

Notice:
1. The saturation current is from +25nA to +200nA,if the current is over the range, please make sure the DO electrode is good.
2. If the temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

DO Reset parameters

RESET PARAMETERS
Reset

This will reset all the calibrated parameters to default.

USB function

Press MODE key to enter the password menu. Press UP/DOWN/SHIFTkey to input password (1300). Press ENTER will proceed to USB setting or press MODE key to exit. If no key is be pressed for over 10 minutes, it will go back to measurement mode.

PASSWORD
0000

PASSWORD
1300

USB setting menu

Press UP/DOWN key to select the functions and then press ENTER key to proceed.

USB SETTINGS
■ Download records □ Update program

1. To download records, plug in a USB flash disk into the USB port and then download all of the records. It takes around 10 minutes to download 500,000 records or 1 minute to download 50,000 records.
2. To update program, save the correct file to the USB flash disk. Plug it to the USB port. Enter the update program function to update it.

Default settings

pH 20.00mA corresponding	14.00	pH	range: -1.00 - 16.00
pH 4.00mA corresponding	0.00	pH	range: -2.00 - 15.00 difference : 1.00
DO 20.00mA corresponding	200.0	%	range: 10.0 - 200.0
DO 4.00mA corresponding	0.0	%	range: 0.0 - 190.0 difference : 10.0
ppm 20.00mA corresponding	10.00	ppm	range: 1.00 - 20.00
ppm 4.00mA corresponding	0.00	ppm	range:0.00 - 19.00 difference : 1.00
PH current output offset	0.00	mA	range: +/- 1.00
DO current output offset	0.00	mA	range: +/- 1.00
PH current filter	0	second	range: 0 - 120
DO current filter	0	second	range: 0 - 120
PH fixed current output	4.00	mA	range: 4.00 - 20.00
DO fixed current output	4.00	mA	range: 4.00 - 20.00
PH HOLD type	last		range: fixed/last
DO HOLD type	last		range: fixed/last
Relay 1 PH close S.P.	10.00	pH	range: -2.00 - 16.00
Relay 1 PH open S.P.	4.00	pH	range: -2.00 - 16.00 difference : 0.01
Relay 1 DO close S.P.	20.0	%	range: 0.0 - 200.0
Relay 1 DO open S.P.	80.0	%	range: 0.0 - 200.0 difference : 0.1
Relay 1 ppm close S.P.	2.00	ppm	range: 0.00 - 20.00
Relay 1 ppm open S.P.	8.00	ppm	range: 0.00 - 20.00 difference : 0.01
Relay 1 delay time	0	second	range: 0-120
Relay 2 PH close S.P.	10.00	pH	range: -2.00 - 16.00
Relay 2 PH open S.P.	4.00	pH	range: -2.00 - 16.00 difference : 0.01
Relay 2 DO close S.P.	20.0	%	range: 0.0 - 200.0
Relay 2 DO open S.P.	80.0	%	range: 0.0 - 200.0 difference : 0.1
Relay 2 ppm close S.P.	2.00	ppm	range: 0.00 - 20.00
Relay 2 ppm open S.P.	8.00	ppm	range: 0.00 - 20.00 difference : 0.01
Relay 2 delay time	0	second	range: 0-120
Relay 3 period time	1.0	hour	range: 0 - 1000.0
Relay 3 clean time	10	second	range: 0 - 1000
Relay 3 delay time	0		range: 0 - 120

Relay 3 function	error alarm		range: clean/period alarm/ error alarm
Save time	60	second	range: 5 - 120
ID address	1		range: 1 - 255
Baud rate	9600		range: 9600,19200,38400
PH offset	0.00	pH	range: +/- 1.00
DO offset	0.0	%	range: +/- 10.0
ppm offset	0.00	ppm	range: +/-1.00
DO Mode	%		range: %, ppm, mg/L
Temp. Offset	0.0	℃	range: +/- 5.0
Manual Temp.for measurement	25.0	℃	range: -10.0 - 130.0
Manual Temp. for calibration	25.0	℃	range: 0.0 - 60.0
Language	English		range: English/ traditional Chinese /simple Chinese
Filter	1		range: 0 - 10
Temp. probe	NTC22K		range: NTC22K
Pressure	1013	mBar	range: 500 - 9999
Salinity	0.0	ppt	range: 0.00 - 50.00
Membrane coefficient	3.06	%	range: 0.01% - 9.99%

Password

Press MODE key
1100: Calibration mode
1200: Setting mode
1300: USB mode
*If no key is be pressed within 10 minutes, it will return to measurement mode.

Error code

Error 01	Memory error
Error 02	Reading is over maximum
Error 03	Reading is under minimum
Error 04	Temperature is over maximum
Error 05	Temperature is under minimum
Error 06	Current 1 output is over 20.5 mA. The maximum is 22.00mA
Error 07	Current 1 output is under 3.8 mA. The minimum is 3.5mA
Error 08	Current 2 output is over 20.5 mA. The maximum is 22.00mA
Error 09	Current 2 output is under 3.8 mA. The minimum is 3.5mA
Error 10	Record error
Error 11	ADC damage
Error 99	Default parameters lost

RS485 command

The instrument come in standard with Modbus-RTU protocol. All of the data are word type (2 bytes), the range is -32767 ~ 32767 ,16 system.

PC command

	ID address	command	Start address	Data number	CRC16
length	1 byte	1byte	2 byte	2 byte	2 byte
Ex.	0x01	0x03	0x0001	0x0001	0xD5CA

Instrument response

	ID address	command	Data number	data	CRC16
length	1 byte	1 byte	1byte	N byte	2 byte
Ex.	0x01	0x03	0x02	0x02 0xBC	0xB895

If response is 01, the command is wrong.
If response is 02, the address is not correct.
If response is 03, data number is not correct.

command 03: read the settings
command 04: read the readings

04:definition

address

(00)	0x00	pH reading	reading : pH X 0.01
(01)	0x02	PH current	reading : X 0.01
(02)	0x01	%/ppm reading	reading : % X 0.1, ppmX0.01
(03)	0x03	%/ppm current	reading : X 0.01
(04)	0x04	Temperature	reading : X 0.1
(05)	0x05	Error code	reading : X 1
(06)	0x06		
(07)	0x07		
(08)	0x08		
(09)	0x09	Model type	fix to 14

03:definition

Address

(00)	0x00	pH 20.00mA corresponding	reading:X 0.01
(01)	0x01	pH 4.00mA corresponding	reading:X 0.01
(02)	0x02	DO 20.00mA corresponding	reading:X 0.1
(03)	0x03	DO 4.00mA corresponding	reading:X 0.1
(04)	0x04	ppm 20.00mA corresponding	reading:X 0.01

(05)	0x05	ppm 4.00mA corresponding	reading:X 0.01
(06)	0x06	PH Current offset	reading:X 0.01
(07)	0x07	DO Current offset	reading:X 0.01
(08)	0x08	PH Current filter	reading:X 1
(09)	0x09	DO Current filter	reading:X 1
(10)	0x0A	PH Current fixed current	reading:X 0.01
(11)	0x0B	DO Current fixed current	reading:X 0.01
(12)	0x0C	PH Current HOLD type	reading:X 1 0=fixed,1=last
(13)	0x0D	DO Current HOLD type	reading:X 1 0=fixed,1=last
(14)	0x0E	Relay 1 PH close S.P.	reading:X 0.01
(15)	0x0F	Relay 1 PH open S.P.	reading:X 0.01
(16)	0x11	Relay 1 DO close S.P.	reading:X 0.1
(17)	0x12	Relay 1 DO open S.P.	reading:X 0.1
(18)	0x13	Relay 1 ppm close S.P.	reading:X 0.01
(19)	0x14	Relay 1 ppm open S.P.	reading:X 0.01
(20)	0x15	Relay 1 delay time	reading:X 1
(21)	0x16	Relay 2 PH close S.P.	reading:X 0.01
(22)	0x17	Relay 2 PH open S.P.	reading:X 0.01
(23)	0x18	Relay 2 DO close S.P.	reading:X 0.1
(24)	0x19	Relay 2 DO open S.P.	reading:X 0.1
(25)	0x1A	Relay 2 ppm close S.P.	reading:X 0.01
(26)	0x1B	Relay 2 ppm open S.P.	reading:X 0.01
(27)	0x1C	Relay 2 delay time	reading:X 1
(28)	0x1D	Relay 3 clean period	reading:X 0.1
(29)	0x1E	Relay 3 clean time	reading:X 1
(30)	0x1F	Relay 3 delay time	reading:X 1
(31)	0x20	Relay 3 function	reading:X 1 0:clean,1:period alarm 2:Error alarm
(32)	0x21	Record storage time	reading:X 1
(33)	0x22	Mode	reading:X 1 0=%,1=ppm,2=mg/L
(34)	0x23	pH offset	reading:X 0.01
(35)	0x24	DO offset	reading:X 0.1
(36)	0x25	ppm offset	reading:X 0.01
(37)	0x26	Temp. offset	reading:X 0.1
(38)	0x27	Manual temp. for measurement	reading:X 0.1
(39)	0x28	Manual temp. for calibration	reading:X 0.1
(40)	0x29	Temp. compensation	reading:X 1 0=Auto,1=manual
(41)	0x2A	Language	reading:X 1 0=English ,1=traditional Chinese,2=simple Chinese
(42)	0x2B	Filter	reading:X 1